

Appendix G: Examples of Technology Innovation Projects

Optimizing Pump-and-Treat Systems

A long-standing problem with Superfund cleanups has been the cost of pump-and-treat systems, which entail a long-term, time-consuming, and expensive process. A study conducted by the Technology Innovation Program (TIP) found that upward of 95 percent of groundwater remedies were conventional pump-and-treat systems. A subsequent benchmark study on 32 ongoing and completed groundwater pump-and-treat systems found that the average capital cost of these systems is \$5 million, and the average operating cost is \$770,000. This study highlighted the costs to the Superfund program for Fund-lead projects, and the eventual costs to states that take over their management.

To reduce pump-and-treat costs, in 1999, the Office of Solid Waste and Emergency Response (OSWER) initiated efforts to optimize long-term remediation systems by using optimization software in conjunction with groundwater modeling to determine optimal pumping strategies for these systems. Working with the U.S. Army Corps of Engineers, TIP conducted remedial systems evaluations (RSEs) at 20–25 Superfund sites to better understand remedy and plant performance. The RSE process involves an independent team that evaluates the performance of the remedies and makes recommendations for improving the protectiveness and cost-effectiveness of the remedies. At Fund-lead sites, the RSE process has proved beneficial, yielding approximately 270 recommendations, including approximately 65 cost-effectiveness recommendations and over 70 protectiveness recommendations.

Estimated cost savings from this effort are \$5 million per year, or \$150 million over the 30-year life span of the remedies—assuming the recommendations are implemented. The estimated total cost for the optimization effort is approximately \$1.2 million since 1999. This includes costs for initially demonstrating and evaluating the methodology, conducting all of the RSEs at sites, providing classroom and Internet-based training, and developing the guidance documents.

Reducing the Costs of Sampling and Analysis

Another problem addressed by TIP has been how to reduce the costs of sampling and analysis at sites. In the 1990s, TIP began tracking new field-based methods for sampling, monitoring, and analyzing contamination at sites. These methods offered considerable advantages over the sole use of conventional sampling and off-site fixed laboratories for analysis. The field methods are much cheaper per sample, allowing many more samples for the same budget as fixed-laboratory analysis. They are also real-time methods, and can allow the field technician to “follow the trail” of contamination. This saves money by reducing the need to wait for fixed-laboratory results, then remobilize because more data are needed.

However, TIP also found that conventional procedures for assessing sites (e.g., procurement for a specific number of samples, predetermined sample locations) did not allow for optimal use of these improved field methods. Therefore, the TIP developed the Triad approach as a framework within which to implement the methods. This strategy couples systematic planning, dynamic work strategies, and real-time decision making. Cleanups employing Triad can cost substantially less, can be much faster, and can have much greater certainty that all the contamination is dealt with appropriately.

One example of significant cost savings through the Triad approach is the Wenatchee Tree Fruit Test Plot, where the Triad was implemented in 1997. The approach was used with immuno-assay kits paired with traditional fixed-laboratory methods, to delineate the pesticide-contaminated areas of soil at the site that required incineration (high concentrations) or off-site disposal (lower concentrations). The larger number of soil samples that could be analyzed with the kits allowed much better characterization, and reduced the need to excavate, backfill, transport, and dispose of an estimated 120 tons of soil shown to be clean. The costs without the use of the Triad were estimated to be \$1.2 million, compared to the actual cost of \$589,000—a savings of about 50 percent.

Funding for this project is roughly estimated at \$600,000 for Superfund and \$500,000 for Environmental Programs and Management (EPM) appropriation over the last four years, most of which is for product development, training, and site-specific technical support. Total cost savings should be a direct function of the number of sites that employ the Triad framework.

Reducing the Costs of Superfund's Contract Laboratory Program

The Contract Laboratory Program (CLP) provides the EPA Regions with a readily available means to contract with numerous commercial environmental testing laboratories on a fixed price and performance basis for a variety of analytical services that directly support site cleanups. The program includes inherent quality assessment and control provisions. In addition to providing a streamlined vehicle for gathering information about the presence of contaminants at a site, this program provides for better cost management, control, and recovery over alternative approaches that require the Regions to purchase sampling and analytical services on a Region-by-Region, or site-by-site basis (which results in increased sample management, tracking, and overhead costs).

OSWER provides federal oversight of all CLP activities to ensure that clients receive data of known and documented quality, and can easily produce supporting documentation when needed for enforcement or other reasons. In FY 2003, the CLP provided over 120,000 sample analyses in support of cleanups at Superfund, Brownfields, and other contaminated sites. The CLP also provides other analytical services for the Regions (e.g., over 70,000 analyses in support of the World Trade Center response).

In April 1998, OSWER initiated a series of CLP and related innovations geared to strengthen the CLP infrastructure, improve the quality and breadth of its products, and

facilitate regional access to its analytical services. The following examples highlight the benefits realized from several of these innovations.

Information Technology Innovations—OSWER funded the development of software (FORMS II Lite, or F2L) that automates the creation and printing of labels and Traffic Report/Chain of Custody Records, thereby improving field time management and decreasing documentation and transcription errors. F2L saves approximately 15 minutes of work per sample. If used on all Superfund samples, it has the potential to save up to \$2 million a year.

Data Assessment Tool (DAT)—Significant resources in the Regions (e.g., EPA, its contractors, states, other agencies) are used in the process of evaluating data for usability in site decisions. DAT streamlines the data validation process by providing standard tools and reports to assist in this process. DAT provides customized, PC-compatible reports, spreadsheets, and electronic files of such data directly to the data user within 24 to 48 hours of receipt of the data from the laboratories. Since August 1998, DAT has provided a savings of over \$14 million in data review costs alone (not considering reduced data entry costs).

Web-based Contract Compliance Screening (WebCCS)—This innovation was developed to improve the quality of the data submitted by participating laboratories to EPA. It addresses the historical difficulties laboratories experience when they design data deliverables in accordance with specific analytical contract requirements prior to delivery to EPA. Web CCS provides the laboratories an easily accessible tool to predetermine whether their data deliverables are complete and in compliance with contract requirements (prior to submission to EPA). Based on FY 2001 data, this tool saves an estimated \$977,000 in annual contract compliance review costs.

Web-based Invoicing System (WIS)—OSWER developed WIS to reduce the resources spent on cumbersome paper invoicing for the over 120,000 analyses provided every year. WIS enables CLP laboratories to generate, submit, and resubmit invoices via the use of a secure Internet web site. WIS minimizes the need for resubmission by providing access to previously submitted analytical results, allowing laboratories to create invoices based on those results. Since November 2001, all laboratories submit invoices electronically and are paid electronically. This CLP innovation has resulted in a 96 percent reduction of disallowed invoices. Based on FY 2001 data, this tool saves an estimated \$846,000 in annual invoice processing costs.

The above automated system innovations are modifications or changes in accessibility that were made to the Contract Laboratory Program Support System. This system tracks data from sample scheduling through analysis, contract compliance screening, invoice processing, laboratory performance, reporting, cost recovery, and data storage. The annual cost of the system, including security, is approximately \$3.35 million. The annual cost savings described above clearly suggest the benefits outweigh program investments.